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THE SEASONAL AND ECOLOGICAL DISTRIBUTION OF THE COMMON APHID PREDATORS OF CENTRAL FLORIDA

W. L. THOMPSON*

The different species of ladybeetles and syrphus flies, which are the chief predators of aphids, have their likes and dislikes as to their food and seasons of the year. To record some observations on these points is the object of this paper.

The records from August 1, 1926 to March 7, 1927 were taken from Mr. R. L. Miller's report of 1926 and 1927 of the Citrus Experiment Station, Lake Alfred, Florida.

Cycloneda sanquinea immaculata Fab. (Blood Red Ladybeetle). Our most common ladybeetle predator on aphids seems to have a wider range of food and is more in evidence the year around than the other species.

The chief host of the Blood Red appears to be the new citrus aphid *(Aphis spiraecola* Patch). It is found feeding in colonies of these aphids every month of the year but is more abundant from March until May, which are the months the aphids are most abundant. In October 1926 the beetles were fewer in proportion than any other month of the year, only three adults were observed in a count of 40,000 aphids. In January 1927, one adult was observed in a count of 22,600 aphids. There were very few citrus aphids in evidence during the months the beetles were at their minimum. During December 1926 and January 1927 only adults were observed, the larvae making their appearance in February.

As stated above the range of hosts of this beetle is rather wide as it has been observed feeding on the following aphids other than the citrus aphids: Melon Aphid *(Aphis gossypii)* on guava, hibiscus, okra, and melons; *Aphis rumicis* on beans; *Aphis pseudobrassicae* on turnips and rutabagas; *Myzus perci-*

*Contribution from the Department of Entomology, Fla. Agr. Exp. Sta.

cae on eggplants; *Aphis coreopsidis* on *Bidens*, and a green aphid infesting crab grass.

Hippodamia convergens Guer. seems to appear more or less spasmodically. In August 1925 crab grass was heavily infested with aphids and hundreds of larvae and adult beetles were present but in 1926 when the grass was infested Mr. Miller gives no account of observing them with the other predators that were present. From August 1926 to May 15, 1927 they were not observed feeding on citrus aphids or the truck crop aphids. From April 1927 to the present time, December 10, they have been in evidence every month.

Hippodamia convergens was the predominating predator on Myzus persicae on eggplants in April and May, 1927. As high as 59 larvae were counted on one eggplant. *Aphis pseudobrassicae* infesting turnips and rutabagas in the fall and winter months are important hosts also. *Aphis rumicis* infesting beans was practically controlled by Hippodamia convergens with the aid of a few other predators in a patch on the Experiment Station in June and July, 1927. In one count of 6000 aphids on the beans, 98 larvae and three adult beetles were found. The larvae were found to eat an average of 56 citrus aphids per day during their larval stage and adults 87 per day. 98 larvae and three adults should eat approximately 4,671 aphids per day.

In 1925 Hippodamia convergens was quite common feeding on the citrus aphid but in the year 1926 and 1927 there were very few observed feeding on this species of aphid.

Scymnus collaris Melsh has been observed each month in the year but is less common in December and January.

This ladybeetle is the most common predator of the Grape Aphid, *Macrosiphum illinoisinsis* at the Citrus Experiment Station. It is also found feeding on *Aphis gossypii* and *Myzus persicae* infesting truck crops, *Aphis rumicis* on beans and to some extent the citrus aphid.

Scymnus terminatus Say is common in the spring and summer months.

The favorite host of this ladybeetle at the Experiment Station is *Myzus persicae* infesting eggplants and peppers. It is also a predator of *Aphis gossypii, Aphis rumicis*, and the citrus aphid although not very common.

Coccinella oculata Fab. is present in the spring and summer months.

This beetle is sometimes found feeding on citrus aphids but it is not a very common predator in this section. It is more of a scale eater but the larvae were observed feeding on mealy bugs that had infested a guava tree. These beetles were found feeding on mealy bugs in 1926 and 1927.

Vedalia *(Rodolia cardinalis* Muls.), or Australian Ladybeetle is the chief predator of the cottony cushion scale *(Icerya purchasi* Mask). The larvae are sometimes found feeding in colonies of the citrus aphid but are not common. We have never been able to rear a complete generation of these beetles through on the citrus aphid.

Twice-stabbed Ladybeetle *(Chilocorus bivulnerus* Muls.) is found in all months of the year, especially the adults.

It is primarily a scale feeding beetle but is occasionally found feeding on the citrus aphid. We have never been successful in rearing a complete generation through on aphids.

SYRPHUS FLIES

Baccha clavata Fab. is the most common syrphus fly in this section and leads all the other aphid predators with the exception of a couple of months in the year. It is present every month of the year but more abundant in the spring and summer months when the citrus aphids are working. According to Miller, eggs, larvae and pupae were killed by a temperature of 24° F. during January 1927, but they mostly withstood a temperature of 24° F. in January 1928.

The chief host of Baccha clavata larvae in this section is the citrus aphid and wherever this aphid is found the larvae of this syrphus fly is nearly always present. Although the citrus aphid appears to be the favorite host the larvae feed on a number of different species of aphids. They have been observed feeding on *Aphis gossypii, Aphis rumicis, Macrosiphum illinoisinsis, Myzus persicae, Toxoptera aurantiae,* a green aphid infesting crab grass, and to some extent on *Aphis pseudobrassicae.*

Baccha lugens Loew is found during nearly every month of the year. Mr. R. L. Miller does not report any from November 8, 1926 to February 2, 1927. Since February 2, 1927 to December 10, 1927 they have been observed every month although only a very few larvae were observed in November and December. They were more common in August than any other month.

Baccha lugens is found feeding chiefly on the citrus aphid and *Toxoptera aurantiae* which is known as the Grapefruit Aphid.

It has been observed feeding on *Aphis pseudobrassicae* on turnips and rutabagas.

Syrphus wiedmanni Johns. *(Syrphus americana* Wied.) is common in late fall, winter and early spring months. In 1925 and 1927 the month of May was the last these syrphus flies were observed until October. There is no record as to when the larvae were last observed in 1926 but they were not present during the summer months.

It seems quite likely that *Aphis pseudobrassicae* infesting turnips and rutabagas is the favorite host of this syrphus fly as these aphids are present during the cool months when these syrphus flies are the most abundant. Although citrus aphids are present in the fall, few larvae are found feeding on them, but in the spring when turnips are not grown and no *Aphis pseudobrassicae* are present, the syrphus fly larvae are common feeding on the citrus aphid until about May 15.

Allographa obliqua Say. is likely to be found in most any month of the year if suitable food is present, but they were found to be most common in November, December and January.

Allographa obliqua is the most common predator of *Aphis pseudobrassicae* at the present time, December 10, 1927, and this species of aphid appears to be its favorite host. It has been observed feeding on citrus aphids in March, April and November and on *Aphis rumicis* on beans in June and July. It was also a predator of the green aphids which infested the crab grass in August, 1925 and 1926.

DR. O. F. BURGER DIES

Dr. Owen Francis Burger, Head of the Department of Plant Pathology of the Florida Agricultural Experiment Station and a member of our society, died on January 26 as a result of an automobile accident. Dr. Burger was born at Freeland, Pa., June 8, 1885. He received his A.B. from Indiana University in 1909; M.S. Florida in 1911; Harvard, 1915; Sc.D. Harvard, 1916. He was Assistant to the Plant Pathologist, Fla. Experiment Station, 1911-1913; Instructor in Plant Pathology, California, 1916-18. He has been head of the Department of Plant Pathology of the Experiment Station since 1918. His cheerful voice and helpful suggestions will be much missed by all his associates on the campus and his numerous friends over the entire state.

The

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CITRUS INSECTS OF HONDURAS

In two recent letters, one to the editor and one to Mr. W. W. Yothers, Mr. R. L. Westmoreland, Jr. gives some interesting information concerning the citrus insects of Honduras.

The most interesting piece of information he gives is the presence of the Citrus Aphid *(Aphis spiraecola* Patch) in that country. Specimens were sent to Mr. Yothers and were identified by the specialists in the U. S. Bureau of Entomology. As to the severity of the infestation he states:—"So far the Citrus Aphid does not seem to be so hard on the new growth as in Florida. They appear not to curl the leaves half as badly as they do in Florida. We have new growth on the trees most all months of the year except possibly two in midsummer. Apparently some fungus is keeping the aphid under fairly good control, as dead ones are frequently seen covered with a fungus-like growth. One of the oldest grove men here is from Wildwood, Fla. He is a very good citrus man and has been in this country for nearly thirty years. He states that he has observed the citrus aphid for ten years to his clear knowledge."

Another citrus insect is the Purple Scale,—"Very severe in some old groves especially some that suffered severely from a three months' drought last summer. I have noticed some Red-headed Scale fungus on this scale but it does not appear in large quantities as you see it in Florida groves. From November to February we have four months of continuous rain."

"In the woods of this country you find the sour orange, bitter sweet orange, key lime and rough lemon. They are similar

in every way to the native or wild ones in Florida. Also you find a sweet orange growing in the dense woods and as far as I can see it is the same as the seedling type you see in Florida."

"Limes and lemons from this country are allowed to enter the States, but the line is drawn on oranges and grapefruit on account of the Mexican Fruit Fly. So far I have not been able to find any of these flies around. Most of the fruit now goes to England by ice boat."

"For the past month we have been very busy fighting the flying locust, which is about a third smaller than the Lubber Grasshopper of Florida and about the same color. They seem to hatch out west of us and they travel east in swarms so thick they darken the clouds. When they settle down, the ground looks like autumn leaves have covered it. They may stay for a day or two, or just a few minutes. If they do stay and are not ready to breed, they will eat everything green in sight. They will completely defoliate a very large citrus tree in a few minutes. If they are ready to breed, they will eat very little and will copulate for several days, and all the time this process is going on, the female is laying about sixty eggs, in the ground. The eggs hatch in three or four weeks and millions of little hoppers are in great droves and if they are not killed immediately they will in a few days begin to feed upon the foliage of the citrus trees. They do not seem to have any preference as to food. They eat all the leaves off bananas, cocoanut palms and everything green they can chew on. So far our best method of control is to use knapsack sprayers and spray the colonies of young ones with distilate. It is very expensive, but efficient for the ones that hatch out in our groves, but we have found no way to control the adult which flies into the grove without a minute's notice and eats all the leaves off the trees.

Ten years ago this same kind of locust came thru this country and nearly ruined it, but at the end of the first year of its appearance, a parasitic fly completely controlled it. Now the fly is becoming very abundant here and a research department has an entomologist breeding the flies in cages and letting them loose in heavily infested areas. This fly is very similar to the one that parasitises the green pumpkin bug in Florida. So far as we can determine, there appears to be two species of these flies, and specimens have been sent to Washington, D. C. for identification."

THE SCARABAEIDAE OF FLORIDA

By W. S. BLATCHLEY
Dunedin, Florida

(Continued from page 46)

The sources of information on which the present paper is based are as follows: *(a)*. My private collection, taken personally during the months from November to April, inclusive, in the past 16 years, mainly in the southern half of the State. As many of the Scarabaeidae are in the adult stage in the summer months only, my collection therefore lacks numerous species. Of the list which follows it contains from Florida only those species whose serial number is preceded by an asterisk (*) or 102 of those recorded from the State. *(b)*. The members of the family in the collections of the Agricultural Experiment Station and the State Plant Board at Gainesville, which I have examined in part there, and which in part have been sent to me for study. *(c)*. A part of the Florida Scarabaeidae in the collection of W. T. Davis, Staten Island, N. Y., which was sent to me for examination, and also field notes on the remaining species by Mr. Davis. *(d)*. A list of the species of Florida Scarabaeidae, with station records, in the collection of the Brooklyn Museum of Natural History, furnished me by Chas Schaeffer, Curator of Coleoptera in that Museum. *(e)*. A list of Florida Scarabaeidae and station records in the private collection of H. C. Fall, Tyngsboro, Mass., sent me by Mr. Fall. *(f)*. The printed records of Florida species of the family as given in the "List of Works Cited," which follows. *(g)*. Manuscript records, especially those of Schwarz and Hamilton mentioned in the List of Works Cited;" also others kindly sent me by Chas. W. Leng, Staten Island, N. Y., Prof. J. J. Davis, Lafayette, Ind., and Prof. R. W. Dawson, St. Paul, Minn.

LIST OF WORKS CITED IN THE PRESENT PAPER

Arranged alphabetically by authors and years of publication.

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1912—On Some Undescribed Forms of Florida Coleoptera. Can. Ent., XLIV, 330-332.

1916—A New Genus and Species of Nitidulini with Descriptions of other New Species of Coleoptera from Indiana and Florida. Can. Ent., XLVIII, 91-96.

1918—On Some New or Noteworthy Coleoptera from the West Coast of Florida, Pt. IV. Can. Ent., L, 52-59.

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Fall—H. C.—1905—New Species of Coleoptera, Chiefly from the Southwest. Can. Ent., XXXVII, 270-276.

1909—Revision of the Species of Diplotaxis of the United States. Trans. Amer. Entom. Soc., XXXV, 1-97.

Hamilton, Dr. John—1888—A Manuscript List of Coleoptera taken in the Vicinity of St. Augustine, Florida by Rev. Chas. Johnson.[1]

1894—Coleoptera taken at Ft. Worth, Florida. Can. Ent. XXVI, 250-256; XXVII, 317-322.

Horn, Dr. G. H.—1870—Description of the Species of Aphodius and Dialytes of the United States. Trans. Amer. Ent. Soc., III, 1870, 110-134.

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1887a—Revision of the Species of Lachnosterna of America North of Mexico. Trans. Amer. Ent. Soc., XIV, 209-296.

Hubbard, Henry G.—1894—The Insect Guests of the Florida Land Tortoise. Insect Life, VI, 302-315.

[1]See Schwarz, Proc. Wash. Entom. Soc., I, No. 3, 1889. All St. Augustine records by Hamilton refer to this list.

LeConte, John L.—1856—Synopsis of the Melolonthidae of the United States. Journ. Acad. Nat. Phil., (2), III, 225-288.

1878*—New Species of Coleoptera from Florida.[2] Proc. Amer. Phil. Soc., XVII, 373-434.

Leng, C. W.—1920—Catalogue of the Coleoptera of America North of Mexico, pp. 1-470.

Linell, Martin L.—1895—New Species of North American Coleoptera of the Family Scarabaeidae. Proc. U. S. Nat. Mus., XVIII, 721-731.

Schaeffer, Chas.—1906—On Bradycinetus and Bolboceras of North America, with Notes on other Scarabaeidae. Trans. Amer. Ent. Soc., XXXII, 249-260.

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1915—New Coleoptera and Miscellaneous Notes—II. Journ. N. Y. Ent. Soc., XXIII, 47-55.

Schaupp, F. G.—1878—Addition to Schwarz' List of Florida Coleoptera. Bull. Brooklyn Entom. Soc., I, 34.

Schwarz, E. A.—1878*—Descriptions of New Species of Coleoptera from Florida. Proc. Amer. Phil. Soc., XVII, 354-372.

1878*—List of Species of Coleoptera from Florida. Proc. Amer. Phil. Soc., XVII, 434-472.

Schwarz, E. A.—A manuscript list[3] of all additions to his "Coleoptera of Florida," up to about 1910. This list is in the Smithsonian Library.

Slosson, Mrs. A. T.—1893—Spring Collecting in Northern Florida. Journ. N. Y. Ent. Soc., I, 147-152.

Smith, John B.—1889—Some New Species of Lachnosterna. Entom. Amer., V, 93-99.

Wickham, H. F.—1909—A List of the Van Duzee Collection of Florida Beetles. Bull. Buffalo Soc. Nat. Sciences, IX, 399-405.

In the list of species which follows, the sequence and the nomenclature, with rare exceptions, is that of Leng's "Catalogue of the Coleoptera of America North of Mexico," and the number in parenthesis before each species is that of said Catalogue. Where a species was originally described from Florida the date of year and page follows the name of author, the name of the publication in which the description appeared being given after the date of that year in the "List of Works Cited." The species collected by Dietz are in the Brooklyn Museum collection and the records were furnished by Chas. Schæffer. In most instances the station where taken is mentioned but once, though it may have been taken or recorded from there by several persons.

[2]The three papers marked with an asterisk comprise the work of Schwarz entitled "The Coleoptera of Florida." Since the Leconte article is included I have thought it best to list the three separately.

[3]This is an annotated copy of the "Coleoptera of Florida" in which all additional species of Florida Coleoptera taken by Schwarz and others up to about 1910 are carefully recorded, with localities, dates, etc. Through the kindness of Mr. Schwarz I was able to borrow this annotated list from the Smithsonian Library and made a copy of all the manuscript additions and records.

The names of authors whose locality records are mentioned or of those who furnished manuscript data are, to save space, usually abbreviated as follows:

Agr. Exper. Station Collection=Ag. Coll.
Blatchley, W. S.=Bl. or Blatch.
Casey, Thos. L.=Csy.
Castle & Laurent=C. & L.
Davis, John J.=J. J. D.
Davis, W. T.=Dav.
Dawson, R. W.=Daw.
Dozier, H. L.=Doz.
Hamilton, John=Ham.
Leconte, J. L.=Lec.
Schaeffer, Chas.=Schf.
Slosson, Mrs. A. T.=Sloss.
Schwarz, E. A.=Sz.
State Plant Board Collection=P. B. Coll.
Wickman, H. L.=Wick.

CLASSIFICATION

The classification and nomenclature of the Scarabaeidae of North America is greatly in need of revision. The only recent work is that of Casey (1915), which treats of but three of the subfamilies, and many of the species recognized or described by him will in time be found to be mere varieties of the older named forms. Revisions of a number of genera have been made in the past by Horn, Schæffer, Fall and others, but these are widely scattered and most of them out of print. It is thought best, therefore, to incorporate in this paper a key to the subfamilies and tribes which are represented in Florida, together with a short diagnosis of each genus and species. The tribes and subtribes as recognized in the "Classification" of Leconte and Horn (1883) have, by Casey, Leng and other recent authors, been raised to subfamily and tribal rank and will be so regarded in this work. The keys apply only to such subfamilies and tribes as are represented in Florida. They embody the most distinctive characters, and these are often not repeated in the text, so that the keys should always be used in connection with the generic and specific descriptions.

KEY TO SUBFAMILIES OF FLORIDA SCARABAEIDAE

a. Abdominal spiracles all situated in a line on the membrane connecting the dorsal and ventral horn-like segments and all wholly covered by the elytra; upper surface of the head usually much dilated on the front and sides; tarsal claws simple, rarely wanting; head or thorax, or both often armed with horns or tubercles; dung, carrion or fungus-feeding species. ..... *(Laparosticti).*

b. Abdomen with six visible ventral segments.

c. Antennae 8- to 10-jointed; mandibles (except in *Ochodaeus)* concealed by the clypeus.

d. Pygidium exposed; form rounded or oval; scutellum (except in *Oniticellus)* wanting; hind tibiae (except in first two species of *Canthon)* with a single terminal spur; middle coxae widely separated. Subfamily I. COPRINAE.

dd. Pygidium covered by elytra; scutellum distinct; hind tibiae with two terminal spurs; middle coxae contiguous.

e. Antennae 9-jointed; form oblong or subcylindrical; upper surface rarely pubescent; color black, brown or dull yellow; dung inhabiting species.
—Subfamily II. APHODIINAE.

ee. Antennae 10-jointed; form oval, convex; upper surface with erect hairs; color brown; mandibles exposed; habits unknown. Subfamily III. OCHODAEINAE.

cc. Antennae 11-jointed; mandibles prominent, visible from above; color black or brown, usually shining; pygidium concealed; dung and fungi feeding species. Subfamily IV. GEOTRUPINAE.

bb. Abdomen with five visible ventral segments; pygidium not exposed.

f. Body partially contractile, rounded when in repose, smooth, shining; color black; scutellum relatively large; carrion and fungus feeding species.
—Subfamily V. ACANTHOCERINAE.

ff. Body not contractile, oblong, convex, roughly sculptured; color dull grayish-brown or blackish, usually covered with a thick dirt colored crust; scutellum small; front femora very wide; skin and dry carrion inhabiting species. Subfamily VI. TROGINAE.

aa. Only the basal three spiracles situated on the connecting membrane, the others on the ventral segments, the last one or two visible behind the elytra; upper surface of the head rarely dilated on the sides; pygidium always visible; vegetable feeding species.

g. Abdominal spiracles, except the basal ones, placed in a single line on the superior part of the ventral segments; mandibles concealed by the clypeus; antennae 7- 10-jointed; tarsal claws usually cleft at tip and toothed beneath; head and thorax never armed; body loosely jointed; hind legs usually very long. Subfamily VII. MELOLONTHINAE.

gg. Abdominal spiracles placed in two strongly diverging lines on the dorsal part of the ventral segments; mandibles usually visible from above; antennae 9- or 10-jointed; tarsal claws variable; body stout, compact; hind legs of normal length.
—*(Pleurosticti).*

h. Tarsal claws unequal, the inner one much the more slender; labrum visible; head and thorax unarmed; tarsal joints short, cylindrical; leaf-feeding species. Subfamily VIII. RUTELINAE.

hh. Tarsal claws equal (except in male of *Ligyrodes);* labrum concealed beneath the clypeus.

i. Front coxae transverse, not prominent; body above (except in *Phileurus)* convex; head or thorax or both, often armed with horns or tubercles; scutellum as broad as long, narrowly rounded behind; mes-epimera not visible from above. Subfamily ~~VIII.~~ DYNASTINAE.

ii. Front coxae conical, prominent; body more or less rhomboidal and subdepressed; head and thorax (except in *Cotinis)* unarmed; scutellum distinctly longer than broad, pointed behind; mes-epimera (except in tribe Trichiini) visible from above; pollen and fruit feeding species.
—Subfamily ~~IX.~~ CETONIINAE.

A LIST OF THE SPECIES AND VARIETIES OF SCARABAEIDAE WHICH ARE KNOWN TO OCCUR OR HAVE BEEN RECORDED FROM FLORIDA.

Subfamily COPRINAE

Dung-eating or carrion beetles, usually of small or medium size and short rounded form, having the upper surface of head usually much dilated on front and sides; antennae 8-10-jointed, club 3-jointed; abdomen with six visible ventrals; hind tibiae (except in species Nos. 1 and 2) with a single terminal spur; pygidium exposed.

KEY TO TRIBES OF FLORIDA COPRINAE

a. Middle and hind tibiae slender, feebly curved, but little enlarged at tip; head and thorax unarmed in both sexes.
Genera I and II. Tribe SCARABAEINI.

aa. Middle and hind tibiae with apical halves gradually dilated; males usually with horns on head or thorax, or both.
Genera III-VIII. Tribe COPRINI.

Genus I. CANTHON Hoffmansegg

Black or bronzed (rarely green) Coprinids, varying much in size and having the sexes alike with head and thorax unarmed; front margin of clypeus usually with distinct teeth; epipleura of elytra narrow; front tarsi distinct. The larger species are usually known as "tumble bugs," and were formerly common along country roads where they rolled balls of dung to a convenient burying place and either used it as a food supply for themselves or after placing a few eggs in the side of the ball, buried it to serve as future food for the larvae. Since the automobile has replaced the horse and eliminated their food from the roadways, these beetles are seldom seen.

*1. (13038). **C. nigricornis** (Say).

Length 6-9 mm. Black, opaque; clypeus 4-toothed; hind tibiae with two spurs.

Northern half of State, frequent; south to Lake Worth (Ham.); Tampa (Sz. Ms.); Estero (Wick.).

*2. (13038a). **C. punctaticollis** Schffr. 1915, 50.

Form, size and characters of *nigricornis*. Head and thorax not granulate as there but minutely sparsely punctate.

Enterprise (Dietz). Dunedin, March 15, (Bl). In my opinion this is a distinct species.

*3. (13040). **C. depressipennis** Lec.

Length 8-11 mm. Greenish-black head and thorax thickly granulate; hind femora minutely punctate.

Throughout the State. Jacksonville, April 4 (Bl.). Gainesville; "very common around dung in roads, April-Sept." (Doz.). Key West (Sz. Ms.).

*4. (13042). **C. probus** (Germ.).

Length 5-6 mm. Black. feebly shining; nearly smooth, finely alutaceous; clypeus with four prominent teeth.

Enterprise (Sz.-Dietz); St. Augustine, Crescent City and Centerville, (Sz. Ms.); St. Mary and Marion Co. (Fall). Dunedin, two only, Feb. 10-March 22 (Bl.).

5. (13047). **C. vigilans** Lec.

Length 17-22 mm. Black, opaque, antennae ferruginous; eyes, as seen from above, twice the width of those of *laevis;* clypeus bidentate, the teeth prominent.

Ft. Myers, March 31-April 23, at light (Dav.). The first record for the State.

*6. (13048). **C. lævis** (Drury).

Length 10-19 mm. Black, often with a coppery or bluish tinge; clypeus bidentate, the teeth short, obtuse, often subobsolete; antennae dark brown.

Recorded from numerous stations. Formerly common throughout the State, now apparently much less so. In a bluish Key West specimen received from Davis the elytra bear numerous scattered, blister-like granules, these in addition to and eight or ten times as large as the normal ones.

*6a. (13048a). **C. lævis viridescens** Horn.

A bright green color variety of *laevis*.

Enterprise (Schf.); Lake City (Bl.).

*7. (13052). **C. viridis** (Beauv.).

Length 4-5 mm. Green or bronzed, smooth, shining; clypeus bidentate; sides of thorax with transverse carina beneath.

Enterprise, rare (Sz.); Crescent City (Sz. Ms.); Lake Worth (Dietz.); Ormond, April 6 (Bl.). This and the next are our smallest species of the genus.

*8. (13053). **C. perplexus** Lec.

Length 3.8-5.5 mm. Brown, bronzed, strongly shining; clypeus 4-toothed; thorax finely, closely punctate.

Dunedin, July 10, at light; Royal Palm Park, one, Dec. 13; several in April in bottle bait of amyl acetate and molasses (Bl.). Enterprise (Dietz).

Genus II. DELTOCHILUM Eschscholtz

Very large Coprinids, possessing the characters given under subfamily heading and having the epipleurae of elytra wide; tibiae as in *Canthon*, front tarsi wanting. Males with a large dorsal tubercle at basal third of each elytron.

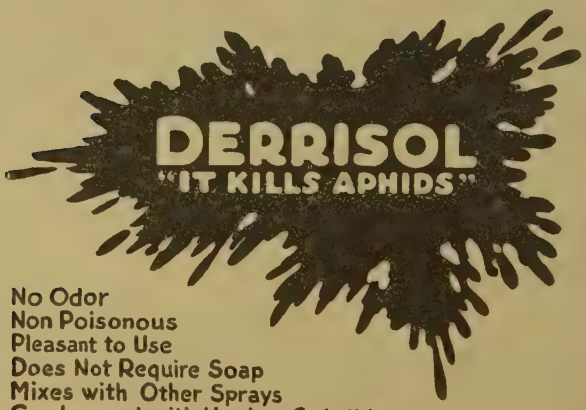
*9. (13054). **D. gibbosum** (Fab.).

Length 24-28 mm. Dull black, opaque.

Throughout the State, including the southern keys, but scarce. Lake City and Gainesville (Ag. coll.); Capron, Sand Point and Enterprise (Sz.); Buck Key (Sz. Ms.); Big Pine Key and St. Petersburg (Dav.); Fruitland Park (Fall). Dunedin, March 21, a half dozen taken from a putrid, extremely fœtid mass of fungi in a dense moist hammock; one, March 11, a captive of the large Carabid, *Pasimachus strenuus* L. (Bl., 1920, 43).

(To be continued)

The New Spray for Aphis



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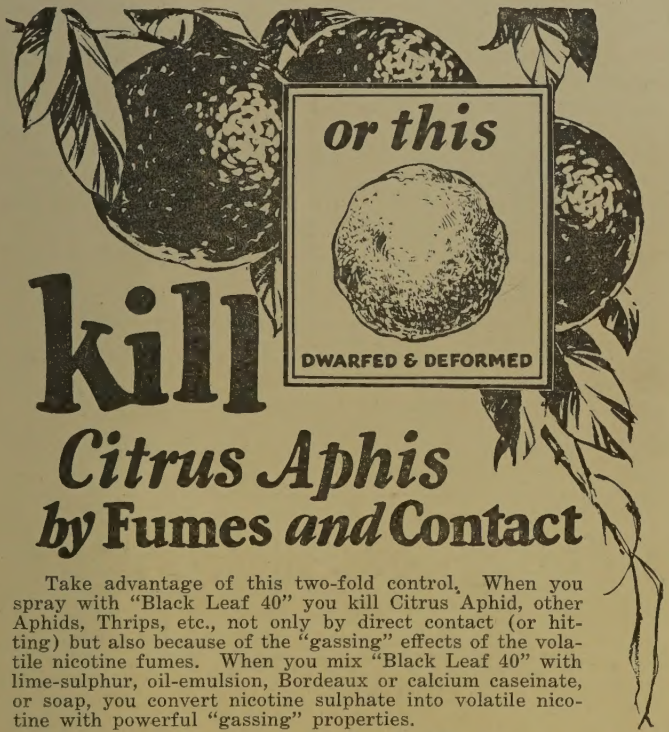

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Take advantage of this two-fold control. When you spray with "Black Leaf 40" you kill Citrus Aphid, other Aphids, Thrips, etc., not only by direct contact (or hitting) but also because of the "gassing" effects of the volatile nicotine fumes. When you mix "Black Leaf 40" with lime-sulphur, oil-emulsion, Bordeaux or calcium caseinate, or soap, you convert nicotine sulphate into volatile nicotine with powerful "gassing" properties.

Likewise, when you dust with Nicotine Dust, insects are killed by actual contact of the dust with their bodies and also by the powerful nicotine gas.

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